THE CLAIMS

What is claimed is:

irradiating the annealed heterogeneous material compound with photons to obtain detachment of the thin layer from the donor substrate along the weakened zone.

- 2. The method of claim 1, wherein the annealing is performed at an energy of up to about 99% of that of a budget of thermal detachment at which the thin layer will detach from the donor substrate.
- 3. The method of claim 1, wherein the annealing is performed at an energy of about 70% to 99% of that of a budget of thermal detachment at which the thin layer will detach from the substrate.
- 4. The method of claim 1, wherein the photons are applied with a wavelength that is absorbable by the donor substrate or the receiver substrate.
- 5. The method of claim 4, wherein the wavelength of the photons is in the ultraviolet region of the spectrum.

- 6. The method of claim 1, wherein the irradiation is performed through the receiver substrate.
- 7. The method of claim 1 wherein the irradiation is performed through the donor substrate.
- 8. The method of claim 1, wherein the first material has a different coefficient of thermal expansion compared to the second material.
- 9. The method of claim 1, which further comprises applying a heat sink proximal to a portion of the heterogeneous material compound, the heat sink being applied to the substrate having the higher thermal expansion coefficient.
- 10. The method of claim 1 wherein the annealing and the irradiation are performed with the same device.
- 11. The method of claim 1 wherein the photons are selected from the group consisting of non-coherent light and laser light.
- 12. The method of claim 1 wherein the irradiation is provided two-dimensionally over a surface of the heterogeneous material compound.
- 13. The method of claim 1 wherein the photons are scanned over the heterogeneous material compound.
- 14. The method of claim 1 wherein the irradiation includes applying a thermal shock to the heterogeneous material compound to induce detachment.

- 15. The method of claim 1 wherein the heterogeneous material compound is cooled down to a temperature of about 18°C to 25°C between the annealing and the irradiation.
- 16. The method of claim 15 wherein the irradiation is performed while the heterogeneous material compound is cooled or after the heterogeneous material compound has been cooled to a temperature below a threshold temperature (T_{Thr}) , wherein an undefined damage of the heterogeneous material compound can occur at the threshold temperature.
- 17. The method of claim 16, wherein the irradiation is performed with a Xenon lamp.
- 18. The method of claim 16, wherein the irradiation is performed with a Halogen lamp.
- 19. The method of claim 1, wherein a selective wavelength is applied by using an irradiation filter during the irradiation.
- 20. The method of claim 1, wherein a spectrum of wavelengths is applied by using an irradiation filter during the irradiation.
- 21. The method of claim 1, wherein the photons are pulsed as they are applied to the heterogeneous material compound.
- 22. The method of claim 1, wherein the photons are applied to an edge portion of the heterogeneous material compound.

- 23. The method of claim 1, wherein the photons are applied to a center portion of the heterogeneous material compound.
- 24. The method of claim 1, wherein the photons are applied to the entire heterogeneous material compound.